

## ABSTRACT OF THE DISCLOSURE

A probe having a pair of closely spaced electrodes is immersed in the lubricant and one electrode is excited with a relatively low voltage AC current. The frequency is swept over a range of about 1 – 10,000 Hertz and the current and phase angle measured at selected frequency intervals. The reactive ( $Z''$ ) and resistive ( $Z'$ ) impedances are computed for each current measurement and values of  $Z''$  plotted as a function of  $Z'$  as a Nyquist plot. The center of curvature of the plot between the origin and the minimum value of  $Z''$  is located; and, the angle of depression of a line from the origin through the center of curvature  $\Theta$  is determined from the plot. Samples of lubricant having known concentration of soot are measured and the angle  $\Theta$  determined for each sample. The angle is then plotted as a function of soot concentration and a smooth curve fitted to the data plots. The curve may be programmed into a microcomputer to be used with the sensor for real time determination of soot concentration.